

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because modified components are not indexed by 100 as set out in Paragraph [0033] of the Specification e.g. reference character "52" has been used to designate both springs and modified springs. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

1. The abstract of the disclosure is objected to because Line 3 references first ball grooves as item 22 which in the detailed description of the drawings is known as item 12. Similarly in Line 4 references second ball grooves as item 12 which in the detailed description of the drawings is known as item 22. Finally, Line 9 references ball cage as item 42 which in the detailed description of the drawings is known as item 41. Correction is required. See MPEP § 608.01(b).

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2. The disclosure is objected to because of the following informalities: Paragraph [0028], Line 6 of the Specification recites "gall" which appears to be a misspelling of the word "ball". Paragraph [0032], Line 6 of the Specification recites "groves" which appears to be a misspelling of the word "grooves".

Appropriate correction is required.

3. Claim 1 is objected to because of the following informalities: Lines 3-4 reference a profiled sleeve with first ball grooves. However, the Specification associates the profiled sleeve with the second ball grooves. Similarly, Lines 5-6 reference a profiled journal with second ball grooves whereas the Specification associates the profiled journal with the first ball grooves.

Claim 25 is objected to because it recites, "first the axial stop." Is this to be taken to mean "the first axial stop,"? Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1 and 18-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacob, US Patent No. 6,217,456 in view of Scharting et al., US Patent No. 4,720,197.

6. As to Claims 1, 18, 19, 29-31 Jacob teaches a longitudinal plunging unit (4) for the transmission of torque in a drive assembly (see Abstract) comprising: a profiled sleeve (6) with circumferentially distributed, longitudinally extending first ball grooves (10); a profiled journal (12) with circumferentially distributed, longitudinal extending second ball grooves (14); balls (17) which are arranged in groups of pairs of first and second ball grooves (see Fig. 2); a ball cage (15) which is arranged between the profiled sleeve and the profiled journal and fixes the balls in their positions relative to one another (Col. 4, Lines 9-19).

Jacob further teaches a first axial stop (the right end face of 11; see Fig. 2) and a second axial stop (the inner face of 6 towards the opening; see Fig. 2) are arranged on opposed sides of the ball cage (see Fig. 1).

Jacob does not expressly disclose a spring which is supported on at least one axial stop and designed in such a way that, in an unloaded condition, the ball cage is held at a distance from the at least one axial stop.

Scharting et al. teaches a helical first spring (4, as viewed from the left of Fig. 1) which is arranged between the ball cage and supported on a first axial stop and a helical second spring (4, as viewed from the right of Fig. 1) which is arranged between the ball cage and a second axial stop and wherein the springs are designed in such a way that, in an unloaded condition, the ball cage is held at a distance from the at least one axial stop so that the cage is held in its adjusted position and is prevented from axial shifting (see Col. 1, Lines 12-16).

Scharting et al. further teaches wherein the first and second springs are pretensioned (see Col. 1, Lines 12-16), are of different lengths (Fig. 2), and the spring comprises at least one helical spring surrounding a portion of the profiled journal and positioned between said profiled journal and said profiled sleeve (in order to locate the ball cage in a specific location) with radial play (to avoid wear on the springs) (see Fig. 1).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the springs and at least one axial stop, designed in such a way that, in an unloaded condition, the ball cage is held at a distance from the at least one axial stop as taught by Scharting et al. in Jacob's longitudinal plunging unit for the purpose of holding the cage in its adjusted position and to prevent axial shifting.

7. As to Claims 20 and 21, Jacob teaches at least one of the axial stops (the inner face of 6 towards the opening; see Fig. 2) is associated with the profiled journal (12).
8. As to Claims 22 and 23, Jacob teaches at least one of the axial stops (the right end face of 11; see Fig. 2) is associated with the profiled sleeve (6).
9. As to Claim 24 and 25, Jacob teaches the first axial stop (the right end face of 11; see Fig. 2) is arranged at an inner end of the profiled journal (12) and the second axial stop (the inner face of 6 towards the opening; see Fig. 2) is arranged at an open end of the profiled sleeve.
10. As to Claim 26, Jacob does not expressly disclose the at least one axial stop is a securing ring which is axially fixed to the profiled sleeve or to the profiled journal.

Scharting et al. teaches at least one axial stop is a securing ring (6), in the form of retaining lips or collars (Col. 2, Lines 13-17), which is axially supported relative to the profiled sleeve or the profiled journal so that a spring may bear thereagainst and be retained within the sleeve (see Col. 2, Lines 34-38)

At the time of the invention, it would have been obvious to one having ordinary skill in the art to use the securing ring of Scharting et al. in the device of Jacob to improve the device for the purpose of retaining a spring within the sleeve.

11. As to Claim 27, Jacob teaches the at least one axial stop is a stop sleeve (11) which is axially supported relative to the profiled sleeve or the profiled journal.
12. As to Claims 28 and 29, it should be noted that the first and second springs of Scharting et al. are pretensioned and of different lengths as discussed above.
13. As to Claims 32-35, it should be noted that the first or second spring comprises a greatest outer diameter which is smaller than a smallest inner diameter of the profiled sleeve in the region of the ball grooves and further that the first or second spring comprises a smallest inner diameter which is greater than a greatest outer diameter of the profiled journal in the region of the ball grooves as taught above by Scharting et al. for the purpose of assembling the device and proper operation.
14. As to Claim 36, it should be noted that the spring at taught by Scharting et al. is firmly connected to the ball cage as discussed above.
15. Claims 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacob, US Patent No. 6,217,456 in view of Scharting et al., US Patent No. 4,720,197 as

applied to claims 1, 18-36 above, and further in view of Welschof, US PGPub No. 2004/0214647.

16. As to Claim 37, Jacob and Scharting et al. do not expressly disclose a group of balls positioned in a common radial plane comprises a greater diameter than the balls of the remaining groups of balls in order to transmit torque (see Paragraph [0026]).

Welschof teaches a group of balls (31) positioned in a common radial plane comprises a greater diameter than the balls (32) of the remaining groups of balls.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the group of balls positioned in a common radial plan comprising a greater diameter than the balls of the remaining groups of balls as taught by Welschof in the device of Jacob to improve the device for the purpose of more effectively transmitting torque.

17. As to Claim 38, Jacob and Scharting et al. do not expressly disclose at least one of the ball grooves of the profiled sleeve or the profiled journal, is arranged outside a region of the regularly distributed remaining ball grooves, wherein the ball grooves of the other of the profiled sleeve or profiled journal are regularly distributed across the circumference.

Welschof teaches at least one of the ball grooves (17) of the profiled sleeve or the profiled journal, is arranged outside a region of the regularly distributed remaining ball grooves, wherein the ball grooves of the other of the profiled sleeve or profiled journal are regularly distributed across the circumference (see Fig. 3) in order to be kept

free from circumferential forces and to not take part in the transmission of torque (see Paragraph [0027]).

18. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use at least one of the ball grooves of the profiled sleeve or the profiled journal, to be arranged outside a region of the regularly distributed remaining ball grooves, and further wherein the ball grooves of the other of the profiled sleeve or profiled journal are regularly distributed across the circumference as taught by Welschof in the device of Jacob modified as above to improve the device for the purpose of it being kept free from circumferential forces and to not take part in the transmission of torque.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The reference Reith et al. (US Patent No. 4,480,879) discloses a rolling bearing arrangement for lengthwise movement of a housing on one or two mutually parallel rails.

The reference Copperwheat (US Patent No. 4,191,280) discloses mechanical link members.

The reference Chou (US PGPUB No. 2003/0030204) discloses adjustable casing for helical spring.

The reference Sloyan (US Patent No. 2,833,598) discloses anti-friction support.

The reference Runkle (US Patent No. 3,318,170) discloses a no-lash axially movable steering column.

The reference Weisneth et al. (US Patent No. 6,659,877) discloses an adjustable-length shaft.

The reference da Silva (US Patent No. 7,018,299) discloses a rolling ball spline slip joint with helically shaped cage.

The reference Grosse-Entrup (US Patent No. 4,103,514) discloses a telescoping torque transmitting shaft.

The reference Anderson (US Patent No. 4,705,491) discloses a telescoping guide, especially for the transmittance of torque.

The reference Duval et al. (US Patent No. 6,343,993) discloses a ball-type system for coupling two sliding shafts.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CLIFFORD J. LOUDEN whose telephone number is (571)270-5504. The examiner can normally be reached on Monday through Thursday, 8:00AM to 4:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Nguyen can be reached on (571)272-6952. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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